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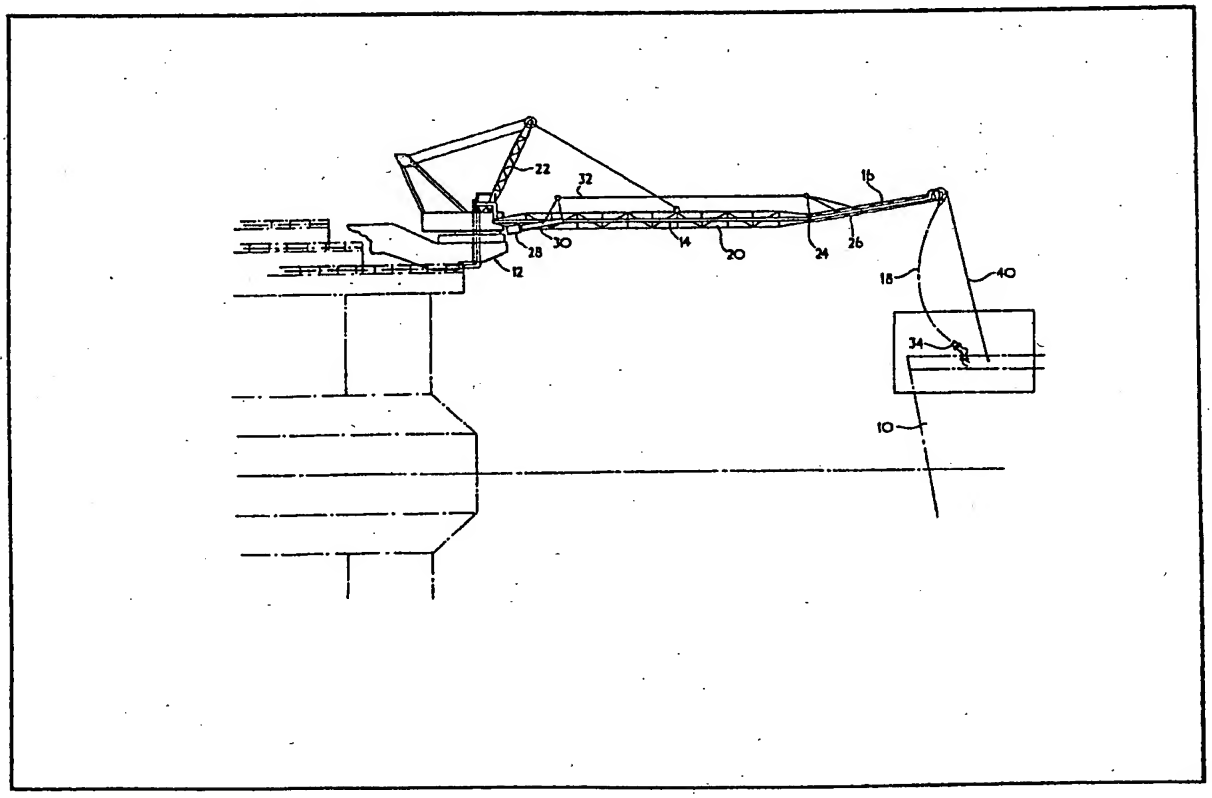
(54) **Fluid Transfer System**

(57) The invention relates to a fluid transfer system for use in an offshore platform. The invention is particularly suitable for use in the transfer of a cryogenic liquid where the product transfer pipe may not be allowed to flex excessively.

The transfer system comprises an inner boom 20 which is heavy and an outer boom 26 which is relatively light and counter-balanced by a weight 28. A product pipe 18 is suspended from the free end of the outer boom which is additially tied to the tank by a cable 40. As the tanker 10 moves up and down relative to the platform 12 the outer boom 26 pivots about the outer end of the inner boom 20 and the cable 40 is maintained in tension. No forces are transmitted by the transfer hose 18 which only flexes to allow lateral movement of the tanker 10.

The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.



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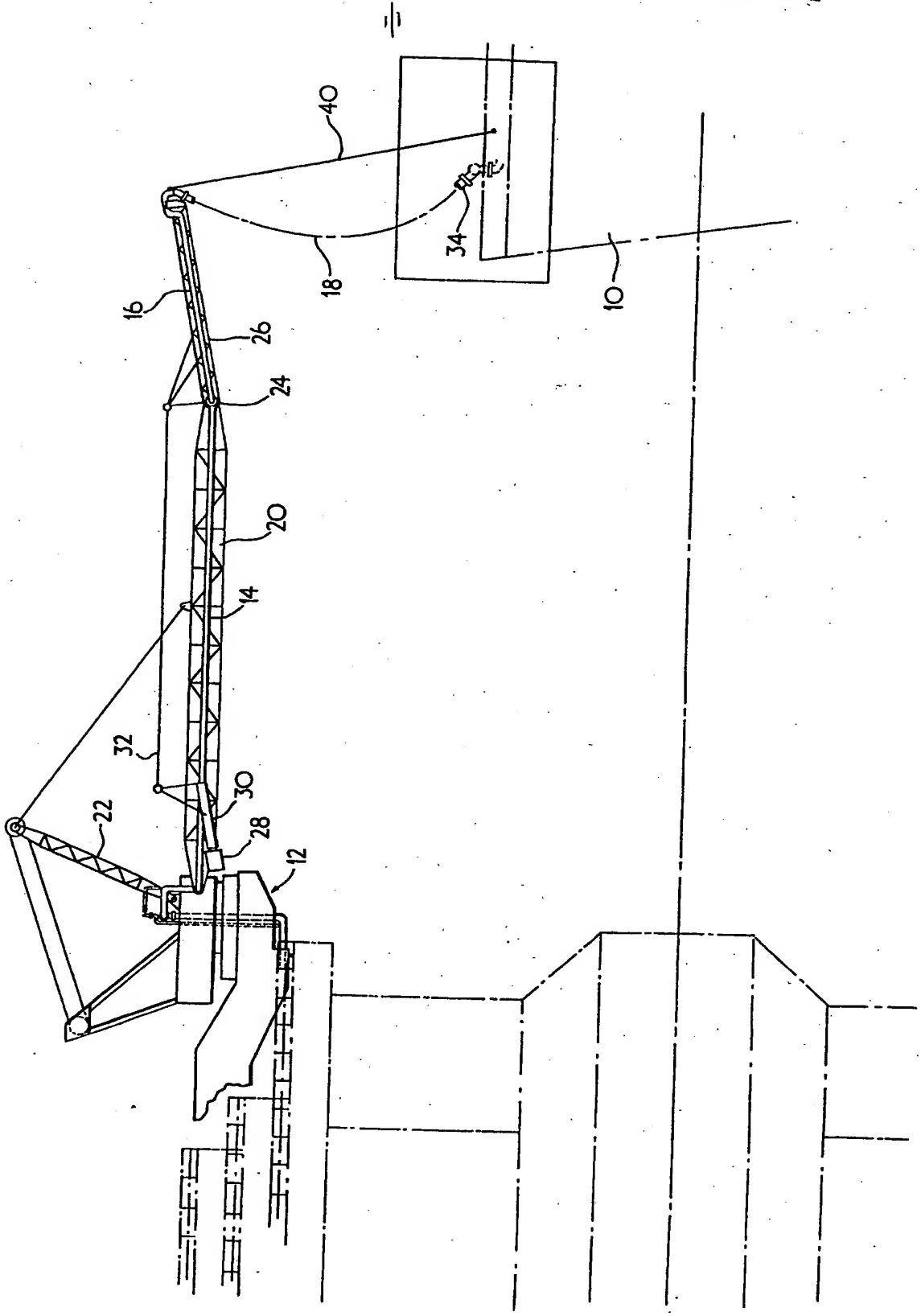

SPECIFICATION
Fluid Transfer System

The present invention relates to fluid transfer system for transferring fluids between a platform and a vessel. The invention is particularly intended to be applied to the transfer of liquefied gas to and from a tanker.

A tanker when used in the North Sea may move by very substantial amounts, both up and down and from side to side, relative to a platform. When a transfer pipe connects the tanker to the platform, it is normal to allow a large amount of slack in the pipe to accommodate such movements. However, liquefied gas presents the additional problem that the pipe cannot withstand excessive flexing.

According to the present invention, a fluid transfer system for transferring fluids between a platform and a floating vessel comprises an inner boom pivotably mounted at one end on the platform and supporting a first, rigid, section of a product pipe; a light counter balanced outer boom pivotably mounted on the outer end of the inner boom and supporting or comprising a second, rigid, section of the product pipe pivotably connected to the said first section; a third, flexible, section of product pipe suspended from the outer end of the outer boom and pivotably connected to the said second section, the lower end of the said flexible third section being provided with a coupling for connection to a flange on the vessel; and means for tying the free end of the outer boom to the tanker; the counter-balance for the outer boom being arranged to over-compensate for the weight of the outer boom whereby the means tying the free end of the outer boom to the tanker is maintained in tension.

The invention will now be described further, by way of example, with reference to the accompanying drawing, which is an elevation of a fluid transfer system in accordance with the invention.

In the accompanying drawing, a product pipe for carrying a cryogenic liquid from a tanker 10 to an oil platform generally designated 12 comprises three sections 14, 16 and 18. The section 14 is rigid and is carried by an inner boom 20 which is pivotably mounted at one end on the oil platform 12. A crane 22 serves to adjust the position of the inner boom 20, the latter being very long and relatively heavy. The section 16 of the product pipe is pivotably connected by a swivel connection 24 to the first section 14 and is carried by a lighter outer boom 26 which is itself pivotably mounted on the outer end of the inner boom 20. The outer boom 26 is counter-balanced by a weight 28 carried by an arm 30 which is pivotably mounted on the inner boom, 20. A cable 32 connects the arm 30 to the outer boom 16. The flexible pipe 18 is freely suspended from the end of the outer boom 26 and is pivotably connected to the second, rigid, section 16 of the product pipe. At its lower end, the pipe 18 is provided with a coupling 34 which connects onto a flange on the tanker 10 in the usual manner. In addition to the pipe 18, a cable 40 which is in tension connects the outer end of the outer boom 26 to the tanker 16. The cable 40 is maintain in tension by virtue of the fact that the counter-balance weight 18 over-compensates the weight of the outer boom 26 and the sections of the product pipe carried by it.

Being relatively heavy, the inner boom 20 cannot follow movements of the tanker 10. The outer boom 26, on the other hand, is relatively light and counter-balanced and it therefore has a small moment about its pivot axis and exerts only a small upward force on the tanker 10 sufficient to keep the cable 40 in tension. The outer boom 26 may therefore freely follow movements of the tanker but at no stage is the flexible pipe 18 put under stress, all this tension being taken by the cable 40. The flexible section 18 of the product pipe is only required to flex by a small amount to allow for lateral movement of the tanker 10 but such movements do not place excessive stress on the flexible pipe 18 even when the fluid being transferred is cryogenic.

Claims

1. A fluid transfer system for transferring fluids between a platform and a floating vessel comprising an inner boom pivotably mounted at one end on the platform and supporting a first, rigid, section of a product pipe; a light counter balanced outer boom pivotably mounted on the outer end of the inner boom and supporting or comprising a second, rigid, section of the product pipe pivotably connected to the said first section; a third, flexible, section of product pipe suspended from the outer end of the outer boom and pivotably connected to the said second section, the lower end of the said flexible third section being provided with a coupling for connection to a flange on the vessel; and means for tying the free end of the outer boom to the tanker; the counter-balance for the outer boom being arranged to over-compensate for the weight of the outer boom whereby the means tying the free end of the outer boom to the tanker is maintained in tension.

2. A fluid transfer system as claimed in Claim 1, wherein the counter-balance weight is pivoted about an arm supported by the inner boom, the counter-balance weight being arranged near the inner end of the inner boom and the said arm being connected by way of a flexible cable to the said outer boom.

3. A fluid transfer system substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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